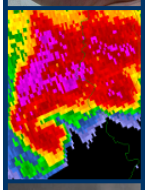
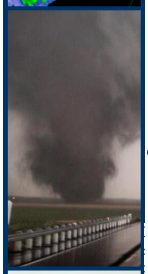
Nebraska/Iowa Severe Weather Awareness Week

March 27 - 31, 2017






Spring Has Sprung! Are you Weather-Ready?

Welcome to spring and the 2017 Nebraska Severe/Iowa Weather Awareness Week. We hope you find the information in this packet and the special time set aside this week useful in preparing yourself, your family or your business for the hazards of Nebraska/Iowa weather. The NWS wants you to not just be ready, but "**Weather-Ready**" for the upcoming severe weather season. When it comes to being Weather-Ready, there are a few simple things you should know:

Know Your Risk

Tornadoes, large hail, damaging thunderstorm winds, floods and lightning can be deadly for the unprepared. Knowing the weather related risks posed to you is the first step in becoming Weather-Ready.

Take Action

You should prepare for the hazards of severe weather season by knowing you are not powerless. You should devise a tornado drill plan for you, your family or your business. You should know what to do if lightning is in the area or flooding becomes threatening. With the hazard potential on the Plains, you should know what to do for each situation and be ready to "take action" if need be. It may save your life and those around you.

Be a Force of Nature

Be an example. Share your preparedness success story by posting on Facebook/Twitter or helping build an online community of the prepared. Look for ways to assist at work or in your community to help your family, neighbors, co-workers, and entire community prepare. #newx

All of us at the National Weather Service are focused on the mission of protecting lives and property through our watches, warnings, advisories and forecasts. We hope you will take advantage of this special time set aside, and the information available, to make yourself and those around a bit safer by becoming "Weather-Ready".

Statewide Tornado Safety Drill

Test Watch:
10 a.m. CDT (9 a.m. MDT)

Test Warning:
10:30 a.m. CDT(9:30 a.m. MDT)

Do you & your family know what to do if a tornado threatens?

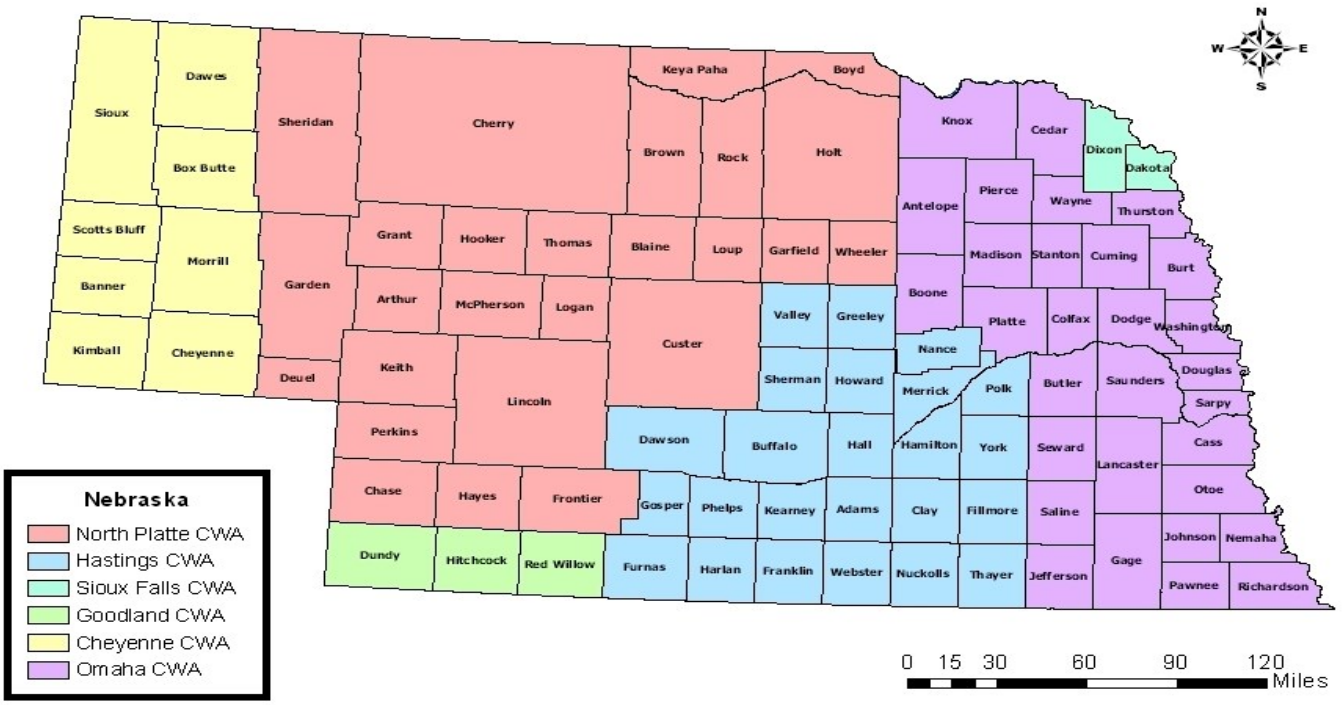
Practice your plan of action!

What's Inside?

National Weather Service Offices Serving Nebraska

Severe Weather Awareness Week - March 27 - 31, 2017

National Weather Service Coverage Area



Panhandle Cheyenne, WY 1301 Airport Parkway Cheyenne, WY 82001 (307) 772-2468 www.weather.gov/cheyenne	**West and North Central** North Platte 5250 E. Lee Bird Drive North Platte, NE 69101 (308) 532-4936 www.weather.gov/northplatte	**Extreme Southwest** Goodland, KS 920 Armory Road Goodland, KS 67735 (785) 899-7119 www.weather.gov/goodland
South Central Hastings 6365 N. Osborne Drive West Hastings, NE 68901 (402) 462-4287 www.weather.gov/hastings	**East** Omaha/Valley 6707 N. 288th Street Valley, NE 68064 (402) 359-9443 www.weather.gov/omaha	**Extreme Northeast** Sioux Falls, SD 26 Weather Lane Sioux Falls, SD 57104 (605) 330-4247 www.weather.gov/siouxfalls

2016 Nebraska Tornado/Severe Weather Facts

Severe Weather Awareness Week - March 27 - 31, 2017

Tornadoes: **45** (3 more the 1950-2016 average of 42 & 8 less the 30 year average of 53)

Deaths: **0** **Injuries**: **0**

Longest Track: **4.62 mi** (July 6th - Extreme Southwestern Cherry County)

Greatest Width: **300 yds** (April 24th - Near Bostwick in Nuckolls County)

Strongest: **EF2** (3 - May 9th in Cass County, June 28th in Cherry County & July 26th in Sheridan County)

Most in a county: **4** (Cherry & Sheridan Counties)

Days of occurrence (1 or more tornadoes): **20**

Most in one day: **7** (July 6th)

Most in one month: **13** (May)

First tornado of the year: **April 24th** (EF1 - Near Bostwick in Nuckolls County)

Last tornado of the year: **Christmas Day** (3 - EF1 in Phelps County, EF0 in Kearney County & Buffalo County)

2016 Monthly Tornado Totals

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Total	0	0	0	5	13	3	10	6	2	0	3	3	45	100%
EF5	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF4	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF3	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF2	0	0	0	0	1	1	1	0	0	0	0	0	3	7%
EF1	0	0	0	2	2	0	2	0	0	0	1	1	8	18%
EF0	0	0	0	3	10	2	7	6	2	0	2	2	34	75%

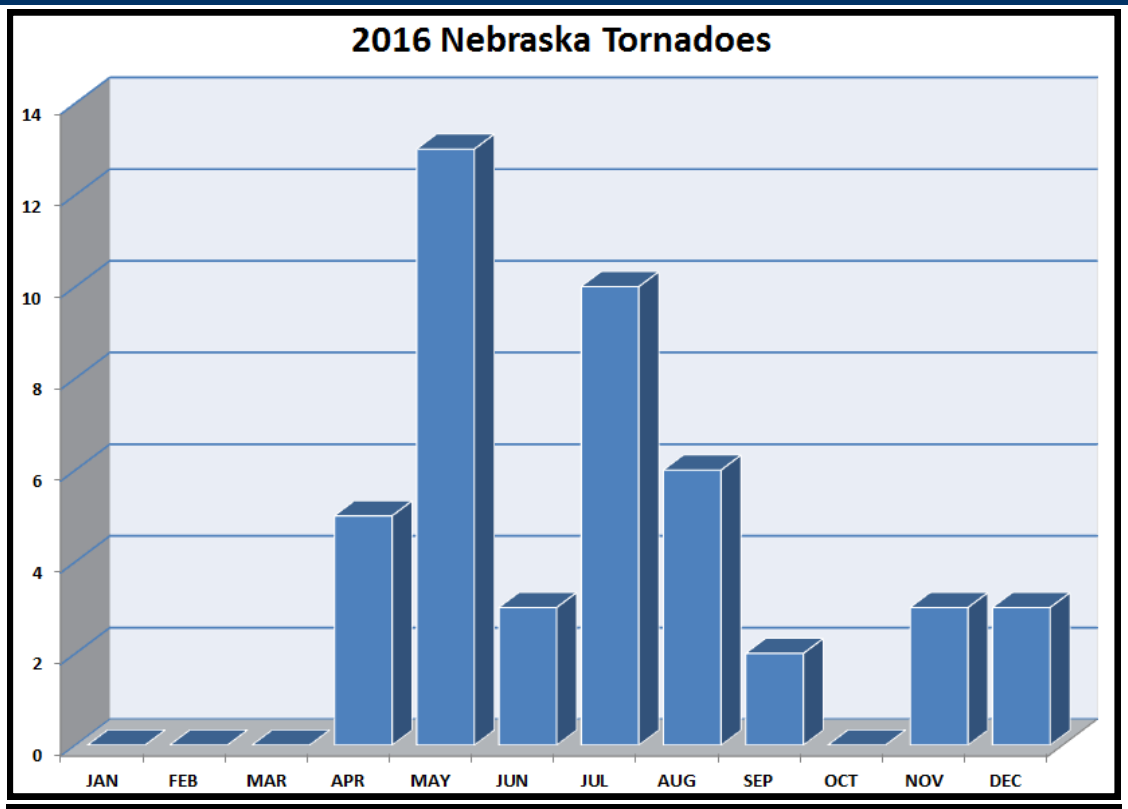
2016 Season Peak

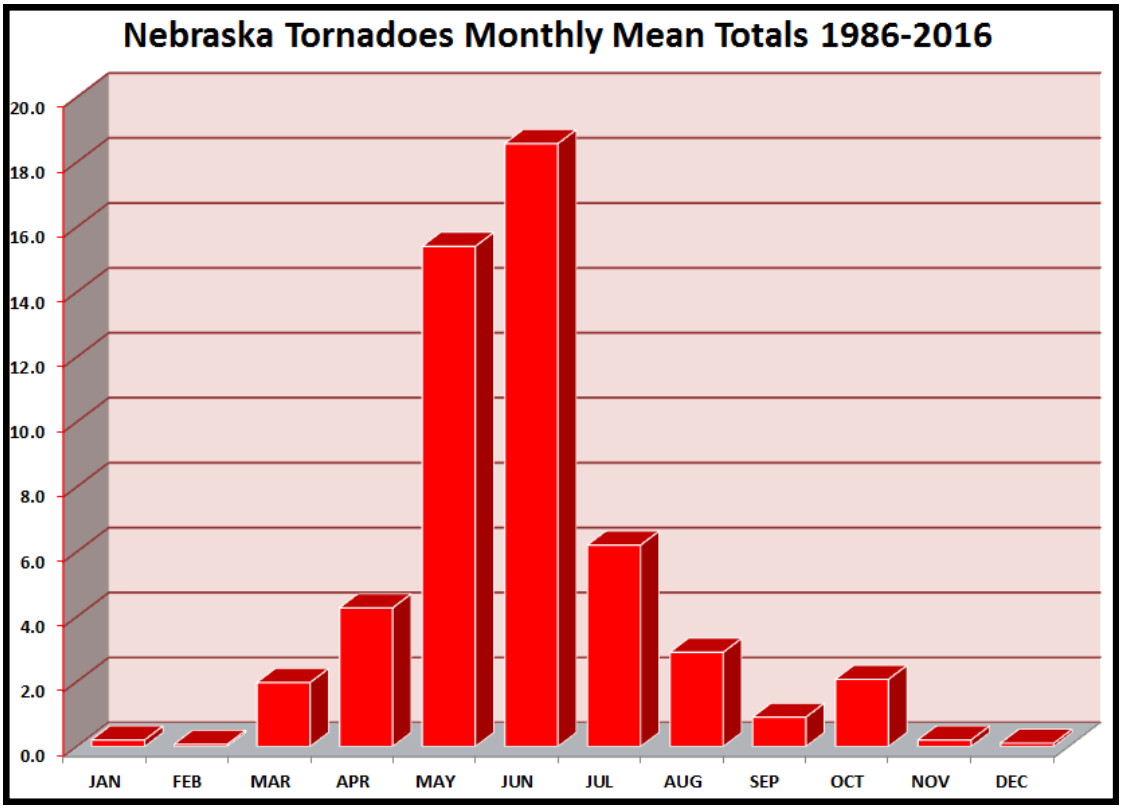
Hail Size: 5.00" on May 9th (Lancaster County - near Cheney)

Wind Gust: Estimated: 100 mph on July 7th - Max (Dundy County)
Measured: 103 mph on June 28th - near Chadron (Dawes County)

Nebraska Tornado Facts

Severe Weather Awareness Week - March 27 - 31, 2017





Nebraska Tornado Facts

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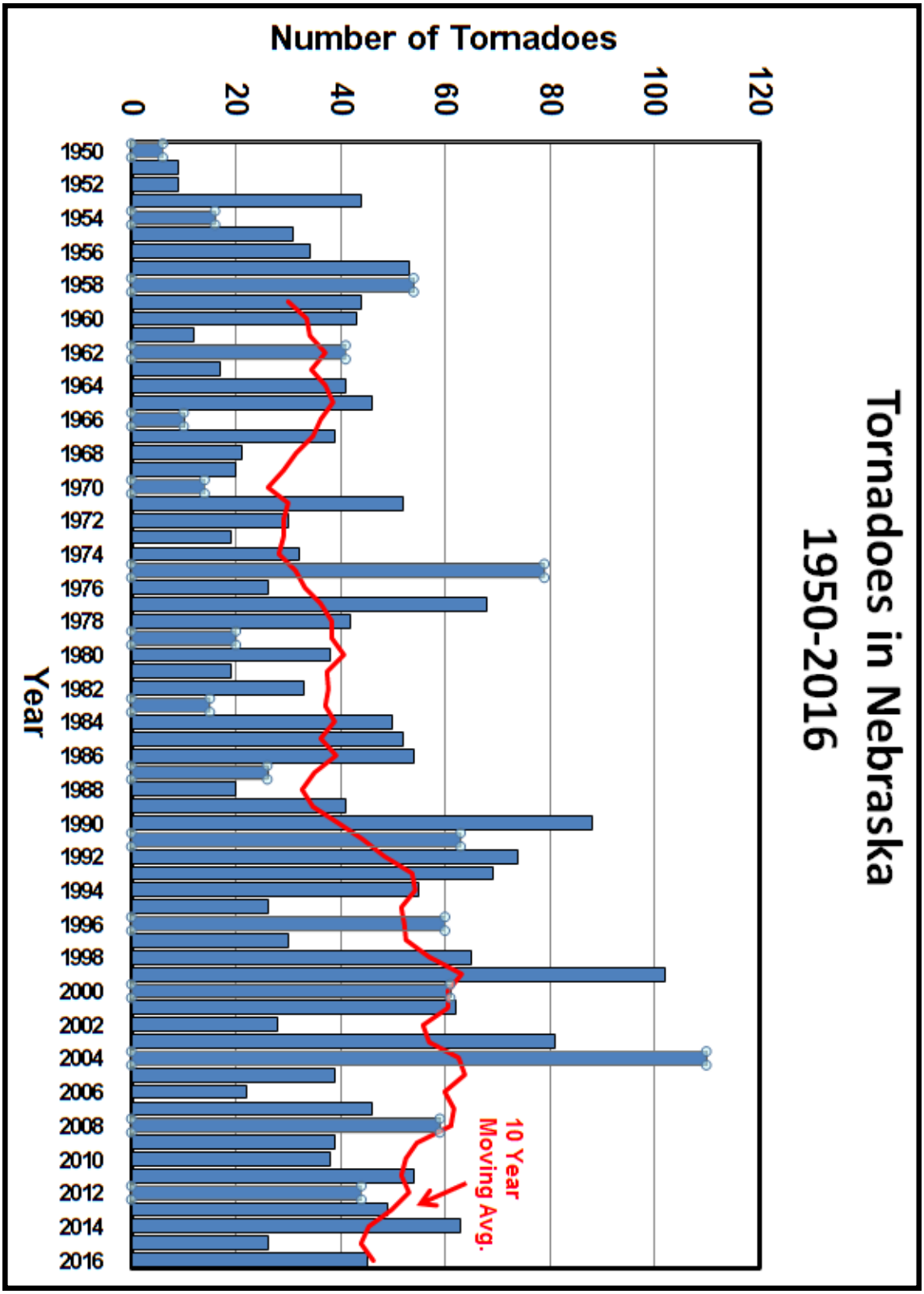

Nebraska Tornado Facts

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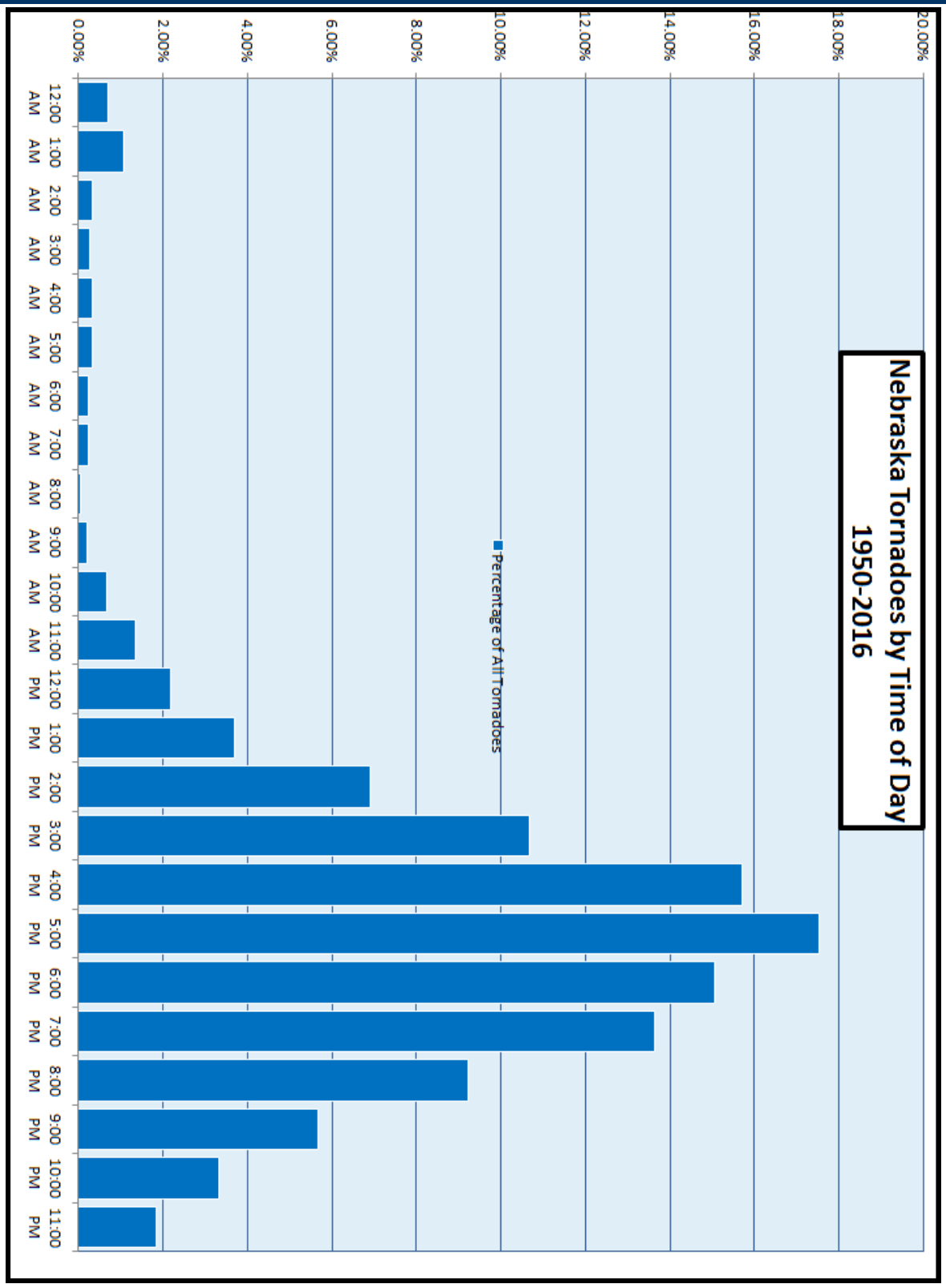

2016 Iowa Tornado/Severe Weather Facts

Severe Weather Awareness Week - March 27 - 31, 2017

Tornadoes: **43** (3 shy of the longer term average of 46)

Deaths: **0** **Injuries**: **12**

Longest Track: **20 mi**

Greatest Width: **800 yds**

Strongest: **EF2**

Most in a county: **3** (Scott and Clinton Counties)

Days of occurrence (1 or more tornadoes): **19**

Most in one day: **5** (April 27th, July 17th, and November 28th)

Most in one month: **13** (July)

First tornado of the year: **March 15th** (3 EF0/EF1 - Scott and Clinton Counties)

Last tornado of the year: **November 28** (7- EF0 Hardin, Grundy, Butler, Mahaska, and Poweshiek Counties)

2016 Monthly Tornado Totals

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Total	0	0	3	5	7	4	13	2	2	2	5	0	43	100%
EF5	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF4	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF3	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF2	0	0	0	0	0	0	2	0	0	0	0	0	2	5%
EF1	0	0	2	1	0	0	4	0	0	2	0	0	9	21%
EF0	0	0	1	4	7	4	7	2	2	0	5	0	32	74%

2016 Season Peak

Hail Size: 2.50" on March 15th (Louisa County - near Grandview)

Wind Gust: 107 mph on October 6th - Near Buffalo (Scott County)
94 mph on October 6th - Near Credit Island (Scott County)

Severe Weather Terminology

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SEVERE THUNDERSTORM - A thunderstorm is considered severe when it produces any of the following: hail 1" (quarter size) or larger in diameter, winds which equal or exceed 58 MPH, or a tornado.

FUNNEL CLOUD - A funnel shaped cloud, usually extending from a convective cloud, which is associated with a violently rotating column of air that is NOT in contact with the ground.

TORNADO - A violently rotating column of air that extends from a convective cloud and is in contact with the ground. The entire column of air associated with a tornado is not always visible. A tornado may only be visible once it has picked up enough dirt and debris.

HAZARDOUS WEATHER OUTLOOK - A product which is issued daily, highlighting any potential significant weather in the area for the next 7 days.

WATCH - Issued when conditions are favorable for the development of severe weather in and close to the watch area. The size of the watch can vary depending on the weather situation and is usually issued for a duration of 4 to 8 hours. During the watch, people should review severe weather safety rules and be prepared to move to a place of safety if threatening weather approaches.

WARNING - Issued when severe weather is detected by radar or reported by storm spotters. Information in this warning will include the location of the storm, what areas will be affected, and the primary threat associated with the storm. People in the affected area should seek safe shelter immediately. Remember that severe thunderstorms can produce tornadoes with little or no advance warning. Warnings can be issued without a watch already in effect.

SIGNIFICANT WEATHER ADVISORY or **SPECIAL WEATHER STATEMENT** - Issued for "near" severe thunderstorms. Typically issued for storms with 3/4" (penny sized) hail and wind gusts near 50 MPH, but can also be issued for large amounts of small hail covering the ground. It is also used as a "heads up" for ongoing severe storms which may move into the area.

SEVERE WEATHER STATEMENT - A product issued which provides follow-up information on any severe weather warnings in effect and conditions which have occurred or are occurring. This information includes updated storm paths and any storm reports, such as hail size or damage, received from spotters.

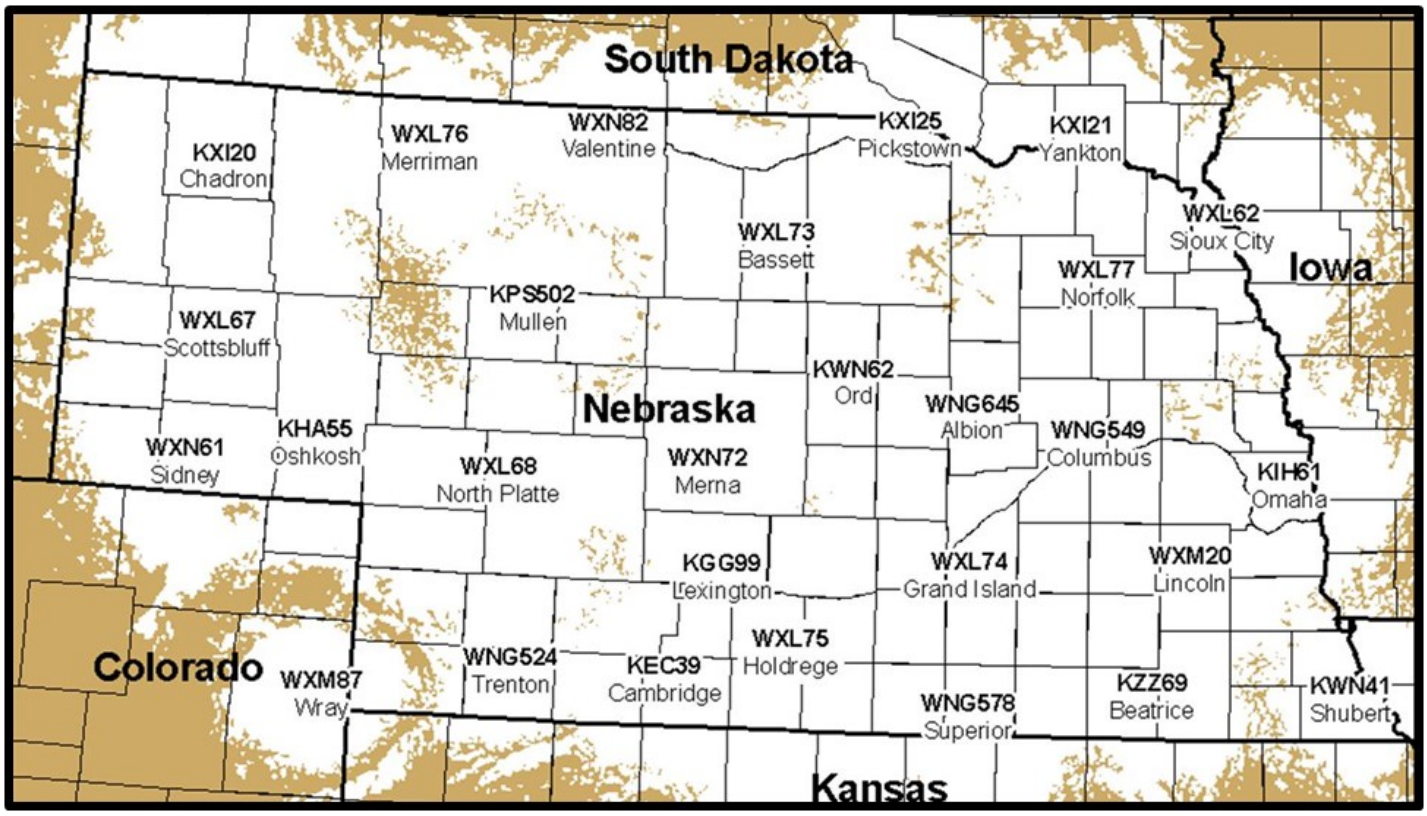
FLASH FLOOD - A rapid rise in water that occurs with little or no advanced warning, usually as the result of intense rainfall over a relatively small area in a short amount of time. Flash Floods can also be caused by dam or levee failures, ice jams, and topography.

FLASH FLOOD WATCH - Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area. When a watch is issued, be aware of any potential flood hazards. Those in the affected area are urged to be ready to take quick action if a Flash Flood Warning is issued or flooding is observed.

FLASH FLOOD WARNING - Issued when flash flooding is in progress, imminent, or highly likely. Those in the affected area should evacuate immediately or move to higher ground if possible. Information in this warning will include the locations in the flood and any areas which may be impacted. Flash Flood Warnings can be issued without a Flash Flood Watch in effect.

NOAA Weather Radio All-Hazards (NWR)

Severe Weather Awareness Week - March 27 - 31, 2017



NOAA Weather Radio All Hazards is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it your single source for comprehensive weather and emergency information. In conjunction with Federal, State, and Local Emergency Managers and other public officials, NWR also broadcasts warning and post-event information for all types of hazards, including natural (such as tornadoes or floods), environmental (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 911 Telephone outages).

Known as the "Voice of NOAA's National Weather Service," NWR is provided as a public service by the National Oceanic and Atmospheric Administration (NOAA). NWR includes 1000 transmitters, covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. NWR requires a special radio receiver or scanner capable of picking up the signal. Broadcasts are found in the VHF public service band at these seven frequencies (MHz):

162.400	162.425	162.450	162.475	162.500	162.525	162.550

Coverage information and SAME Codes for every county in Nebraska can be found at:

www.weather.gov/nwr/Maps/PHP/NE.php

Tornado Safety

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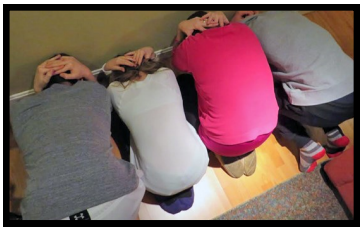
A tornado is a violently rotating column of air in contact with the ground that is capable of destroying anything in its path and hurling objects through the air like deadly missiles. They can produce winds in excess of 200 MPH, be over 1 mile wide and stay on the ground for over 50 miles! Although tornadoes occur in many parts of the world, they are found most frequently in the United States. In an average year, 1,200 tornadoes cause 70-75 fatalities and 1,500 injuries across the nation. Warnings save lives, however deaths and injuries still occur. Some people may not hear the warning, others did but did not believe it would happen to them. Are you and your family prepared for a tornado?

Be Ready Year Round!

- Know the risk for your area. Tornadoes can occur at any time of day, any day of the year.
- Have a NOAA Weather Radio and battery back-up to receive warnings.
- Have a plan of action BEFORE severe weather threatens. You need to respond quickly when a warning is issued or a tornado is spotted.

Prepare!

- Know how your community sends warnings. Some have outdoor sirens, others depend on media and smart phones to alert residents.
- Pick a tornado safe room in your home such as a basement, cellar or an interior room on the lowest floor with no windows. Make sure all members of your family know to go there. If time allows, get your pets.
- Conduct a tornado drill regularly so everyone knows what to do if a tornado is approaching.
- Have a family plan that includes an emergency meeting place.



During a Tornado…

- Take shelter immediately! Remember that occasionally tornadoes can develop so quickly that advance warning is not possible. Stay alert when threatening weather is in your area!
- Get to an underground shelter, basement or safe room.
- Mobile homes are ***not safe!*** Abandon them immediately and go to the nearest sturdy building or shelter.

If you are outdoors, seek shelter immediately! If you cannot quickly get to shelter:

- Get into a vehicle, buckle your safety belt and try to drive to the closest shelter.
- If flying debris occurs while driving, pull over and park. As a last resort:
  - Stay in your vehicle with the seat belt on. Put your head down below the windows, covering with your hands and blanket if possible.
  - If you can safely get noticeably lower than the level of the road, exit your car and lie in that area, covering your head.

- <u>Your choice should be driven by your specific circumstances</u>!

More information and tips on preparing and staying safe during a tornado can be found at:
www.weather.gov/tornado

Flash Flood Safety

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Flash floods are exactly what the name suggest: floods that happen in a flash! On average, flooding results in more deaths than any other thunderstorm hazard. Most occur at night, when it is more difficult to recognize flood dangers, and when people are trapped in vehicles. Do you and your family know what to do in case of a flood?

Remember…

- Don't underestimate the power of water!
- Remain aware of the situation. Water levels and the rate water is flowing can quickly change!
- **DO NOT** drive onto a flooded roadway or through flowing water. If you approach a roadway that is flooded, ***TURN AROUND - DON'T DROWN***.
- **DO NOT** go into any room if water is covering electrical outlets or cords. If you see sparks or hear buzzing, crackling, snapping or popping noises. Get Out!! Do not go into flooded basements. The structure may be compromised.

If a Flash Flood Warning is issued for your area…

- **If advised to evacuate, do so *immediately*!** Act quickly to save yourself. Get out of areas that are subject to flooding and move to a safe area before access is cut off by flood waters.
- **DO NOT** camp or park your vehicle along streams and washes during threatening conditions.
- **DO NOT** drive if not necessary. 12-18 inches of water can carry away most vehicles. Do not drive over a flooded road, the depth of the water may not be obvious and the roadway may no longer be intact. Never drive around a barricade, they are there for your protection! If your vehicle stalls, leave it immediately and move to higher ground before water sweeps you and your vehicle away.
- **DO NOT** try to walk, swim, or play in flood water! You may not be able to determine if there are holes or submerged debris or how quickly the water is flowing. You may be swept away! If water is moving swiftly, as little as 6 inches of water can knock you off of your feet. There is also a danger of hazardous materials polluting the water. Also remember that water is an electrical conductor, if there are power lines down, there is a threat of electrocution.

- Always continue to monitor the situation through the National Weather Service website, your NOAA Weather Radio All-Hazards and favorite local television or radio stations.

For more information and safety tips, visit www.floodsafety.noaa.gov

Lightning Safety

Severe Weather Awareness Week - March 27 - 31, 2017

Lightning is fascinating to watch but is also extremely dangerous. In the U.S., there are about 25 million lightning flashes every year. Each of those 25 million flashes is a potential killer. While lightning fatalities have decreased over the past 30 years, lightning continues to be one of the top weather killers in the U.S. In addition, lightning injures many more people than it kills and leaves some victims with life-long health problems.

Though lightning strikes peak in summer, people are struck year round. In the U.S., an average of 49 people are killed each year by lightning.

Of the 38 killed by lightning in 2016:

- 76% were male
- 76% occurred between Jun-Aug
- 45% were between the ages of 20-39
- 40% occurred on Friday/Saturday

Lightning: What You Need to Know

- ***NO PLACE*** outside is safe when thunderstorms are in the area!!
- When you hear thunder, immediately move to safe shelter: a substantial building or an enclosed, metal-topped vehicle with windows up.
- Stay in safe shelter at least 30 minutes after you hear the last sound of thunder.

Indoor Lightning Safety

- Stay off corded phones, computers and other electrical equipment that put you in direct contact with electricity.
- Avoid plumbing, including sinks, baths and faucets.
- Stay away from windows and doors and stay off porches.
- Do not lie on concrete floors and do not lean against concrete walls.

Last Resort Outdoor Risk Reduction Tips

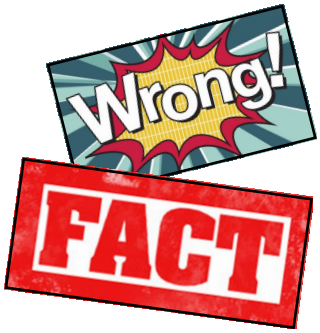
If you are caught outside with no safe shelter anywhere nearby the following actions may reduce your risk:

- Immediately get off elevated areas such as hills, mountain ridges or peaks.
- Never lie flat on the ground.
- Never shelter under an isolated tree.
- Never use a cliff or rocky overhang for shelter.
- Immediately get out of and away from ponds, lakes and other bodies of water.
- Stay away from objects that conduct electricity (barbed wire fences, power lines, windmills, etc.).

Avoid getting caught in a dangerous situation!
If you can hear thunder, you are close enough to be struck by lightning!

Myths & Facts

Severe Weather Awareness Week - March 27 - 31, 2017



Myth - If it is not raining, then there is no danger from lightning.

Fact - Lightning often strikes outside of heavy rain and may occur as far as 10 miles away from any rainfall.

Myth - Structures with metal or metal on the body attract lightning

Fact - Height, pointy shape and isolation are the dominant factors controlling where a lightning bolt will strike.

Myth - Lightning never strikes the same place twice.

Fact - Lightning often strikes the same place repeatedly, especially if it is a tall, pointy and isolated object.

Myth - The rubber soles of the shoes or rubber tires on a car will protect you from being struck by lightning.

Fact - Rubber-soled shoes and rubber tires provide no protection from lightning. The steel frame of a hard topped vehicle provides increased protection if you are inside and not touching metal.

Myth - Overpasses are safe shelters when a tornado strikes.

Fact - Overpasses are unsafe! They can concentrate the wind, causing it to be stronger. People have been killed and injured taking shelter under an overpass.

Myth - Low pressure with a tornado causes buildings to explode. Open a window before taking shelter.

Fact - Opening a window attempting to equalize pressure has no effect. Move to a safe area immediately!

Myth - An approaching tornado will always be visible.

Fact - While most have a visible funnel, it is not always the case. Tornadoes can be hidden by trees and terrain, or may even be wrapped in rain!

Myth - Rivers, lakes and mountains will protect you from a tornado.

Fact - No terrain is safe from a tornado and they can cross bodies of water. Every major river east of the Rockies has been crossed by a significant tornado, and high elevations in the Appalachians, Rockies, and Sierra Nevada have all experienced tornadoes.

Myth - Larger vehicles are safe to drive through flood waters.

Fact - Two feet of rushing water can carry most vehicles away, including SUVs and pickups.

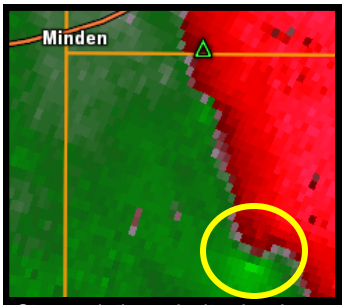
Myth - Flash floods mainly occur in the eastern United States.

Fact - Flash floods have and can occur in all 50 states.

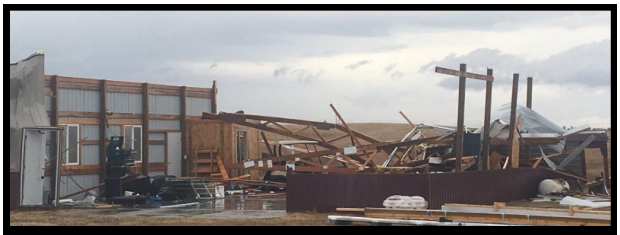
2016 Event Of The Season
Christmas Day Tornadoes

Severe Weather Awareness Week - March 27 - 31, 2017

Christmas Day 2016 will be one for the record books, as a strong storm system moved through northern Kansas and southern Nebraska. The late morning-mid afternoon hours brought a line of thunderstorms which produced some tornadoes and damaging wind gusts. Later that evening, widespread hurricane force winds were recorded for a few hours, causing widespread damage.



Storm relative velocity showing a brief, weak tornado signature southeast of Minden.


Outbuilding damage near Gibbon.

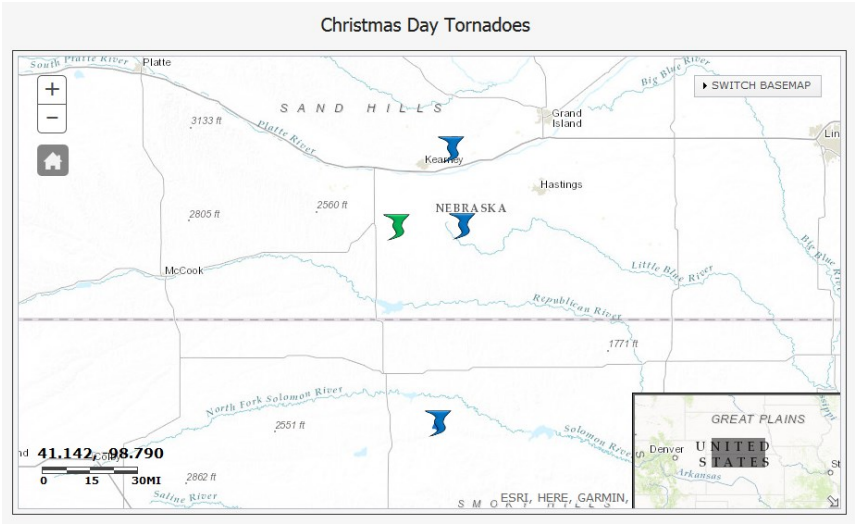
This event brought rare December tornadoes to south central Nebraska. The first brief tornado developed just before noon, touching down at 11:50 AM just south of Funk and tracking northeast for 2.8 miles. The tornado was rated EF1 and damaged at least 6 power poles and 4 irrigation pivots. Another tornado briefly touched down at 12:17 PM and did minor damage to a farm 7 miles southeast of Minden. This tornado was rated EF0. The last tornado set down at 12:24 PM about 4 miles northwest of Gibbon, damaging multiple power poles and irrigation pivots, as well as destroying a small outbuilding in the Blue Sky Subdivision along is 4.2 mile track. This tornado was also rated EF0.


Damage near Ashton.

These tornadoes are the 'latest calendar year' tornadoes in Nebraska since at least 1950 and are the first December tornadoes since December 13, 1975. On that date in 1975, a tornado tracked 8 miles between Chester and Gilead in Thayer County, with another brief tornado near Steinauer in Pawnee County. A deep surface low pressure system formed over Colorado on Christmas morning, and it tracked northeast through western Nebraska, roughly along a line from Imperial to Thedford to Valentine. The barometric pressure was as low as 29.06" (986 mb) as the low passed by each of these locations. As this low entered Nebraska, a strong cold front raced east, crossing the area in the late afternoon and early evening hours. Intense winds ***behind*** the main line of thunderstorms reached 55 to 75 MPH, snapping trees, downing power lines, destroying outbuildings, and whipping through the trees - creating a tremendous roar.

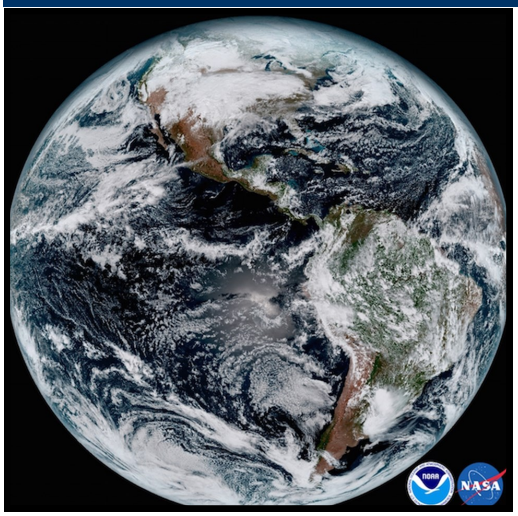
The strongest wind gusts recorded included 79 MPH near Exeter, 78 MPH near Hastings, 76 MPH at the Aurora Airport and 75 MPH near Oxford and at the Grand Island Central Nebraska Regional Airport!


Outbuilding damage near Loup City.



A New Satellite Era Has Dawned

Severe Weather Awareness Week - March 27 - 31, 2017



On November 19, 2016, GOES-R, the first of NOAA's highly advanced geostationary weather satellites lifted off from Cape Canaveral, FL. GOES-R, which now has been named GOES-16, will scan the skies five times faster than today's satellites and provide four times greater image resolution. These advancements will provide forecasters with sharper, more detailed views of evolving weather systems, allowing for improved forecasts and warnings.

The satellite is currently in a test location and is expected to be placed in a permanent orbit later this spring. Additional testing of GOES-16 will occur this summer with the expectation the satellite will become operational in the fall.

Fig. 1 (left): One of the first GOES-16 full-disk images, taken over the Americas on January 15, 2017.

One of the beneficiaries of the high-resolution, GOES-16 data is a storm-prediction model called "ProbSevere", which is a tool used by NWS meteorologists during severe weather operations. The ProbSevere model was developed through collaborative efforts between scientists at the Cooperative Institute for Meteorological Satellite Studies (CIMSS) and the National Oceanic and Atmospheric Administration (NOAA). This real-time statistical model calculates the likelihood that a developing storm will first produce severe weather in the next hour.

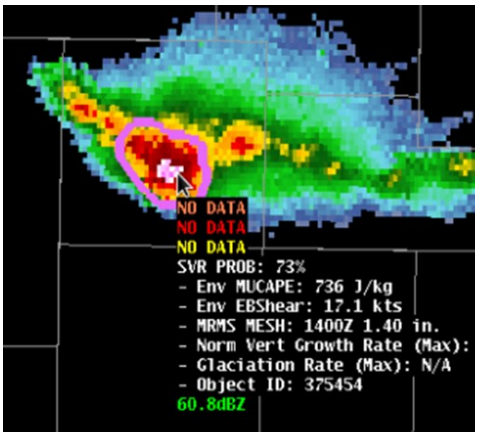


Fig. 2: Information provided by the ProbSevere model.

Four primary data sources are utilized by this model:

1) numerical weather prediction, which provide information about the storm environment
2) satellite data, which provide information about cloud development and how quickly the clouds are growing vertically
3) radar data
4) lightning data, both of which provide additional information about storm characteristics.

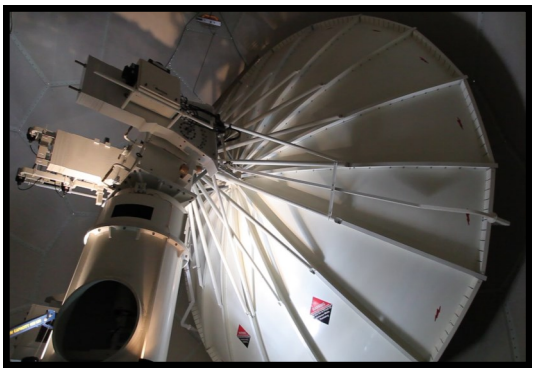
Output from the ProbSevere model is typically used in conjunction with radar data (see Fig. 2) to help warning forecasters identify which storms are developing most rapidly and may pose a severe weather threat in the near future. The ProbSevere model continues to undergo testing and refinement at a number of research facilities around the country.

More information about GOES-16 can be found at

https://www.nesdis.noaa.gov/GOES-16

NWS Radar Service Life Extension Program

Severe Weather Awareness Week - March 27 - 31, 2017



The National Weather Service's (NWS) weather surveillance radars 1988 Doppler (WSR-88D) were commissioned across Nebraska in the early to mid 1990s. Since their installation, the radars have gone through a number of major upgrades. This has included numerous hardware upgrades, increasing the resolution of the radar, as well as the addition of a vertical wave pulse to allow the radar to have dual polarizations. Nevertheless, in an effort to keep the fleet of WSR-88Ds across the county operating well into the future, each radar is scheduled to go through the service life extension program (SLEP). The SLEP consists of 4 steps that will be completed over a number of years. The first step, which is the signal processor technology refresh, is expected to take place this spring. The next 3 steps, transmitter refurbishment, shelter refurbishment, and pedestal refurbishment, will be completed in the coming years.

The signal processor refresh will not only provide the radar with the latest technology supporting the current functionality of the WSR-88D, it also will support future upgrades. The new signal processor will provide significant improvements in antenna control as the radar spins and adjusts vertically during a volume scan. Along with the numerous hardware changes that come with the signal processor refresh, the latest software to support the radar functions will be installed during the upgrade, as well. The most important enhancement with the software is expected to be the hail size discrimination algorithm. This new enhancement is expected to help forecasters identify not only where large hail is occurring, but when significant hail (2" in diameter or larger) might impact an area. These hardware and software enhancements, this year and over the next couple of years, are expected to keep the fleet of WSR-88Ds up to date with the latest technology.

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NWS Hastings is a test office for Instagram, and is currently the only office in Nebraska with an Instagram account. Check us out, follow and interact with us!

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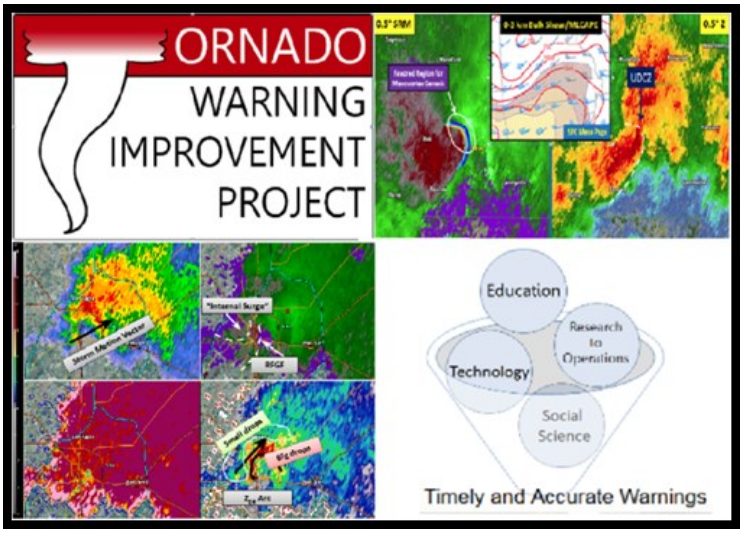
Central Region - Tornado Warning Improvement Project

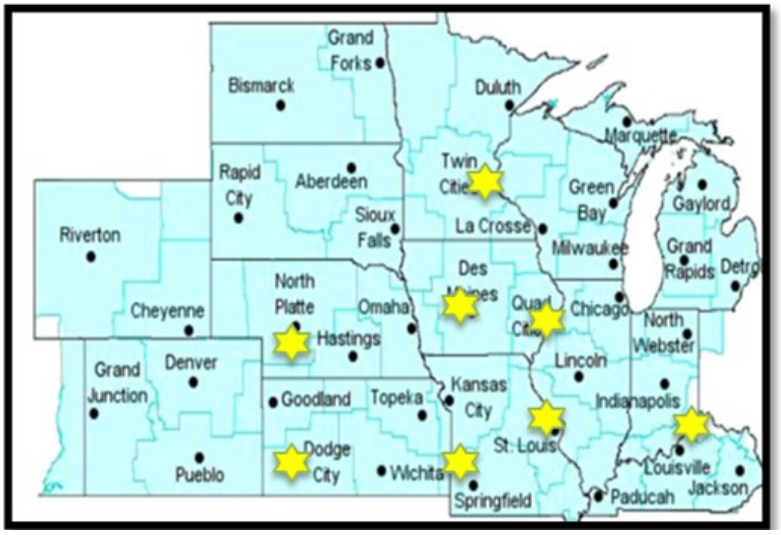
Severe Weather Awareness Week - March 27 - 31, 2017

Project Origination - Developed within the NWS Central Region to develop consistent warning decision making methods involving storms capable of producing tornadoes.



Vision - Develop and deliver an expert-level, continuing education curriculum for tornado warning decision making. A variety of training methods will be utilized in order to facilitate broad, effective learning environments.

Mission - This task force will provide a consistent, scientific approach to the tornado warning process, focusing on both environmental intelligence and probability of impact. This will be delivered as a curriculum to forecasters with warning decision making responsibilities within each of their respective offices, with the goal of evolving to a consistent level of warning philosophy.



Who We Are - A team of forecasters and Science and Operations Officers (SOOs) from across the Central Region of the NWS. Team members were selected from diverse geographic locations, but encompassing all types of severe weather associated with tornadoes. Each of these types of tornadoes present unique challenges to the warning forecasters.

Direct Line to Cutting-edge Research - Members of the team are collaborating with leading researchers to bring the latest advancements in science into the Weather Forecast Office (WFO) and the tornado warning process. Effective training methods will be utilized in order to bring the latest scientific understanding of tornado development quickly to forecasters making the warning decisions.

Communication - The team will also explore ways to improve Decision Support Services (DSS) specifically related to tornado messaging. Finding ways to communicate complicated scientific information effectively to the public, media, emergency officials and others is key to the ultimate goal of saving lives when seconds count.

Focused on the Tornado Warning Process

2016 Nebraska/Iowa Severe Weather Summary

Severe Weather Awareness Week - March 27 - 31, 2017

Nebraska Panhandle - NWS Cheyenne, WY

On **April 25th**, a squall line produced 60 to 65 MPH wind gusts across Scotts Bluff County.

Late afternoon thunderstorms on **May 24th** produced wind gusts to 60 MPH from northwest of Alliance to north of Sidney. Golf ball size hail was reported west of Hemingford on **May 26th**. Quarter size hail was observed at Montrose on **May 29th**. On **May 30th**, three landspout (EF0) tornadoes touched down in open country near Lorenzo.

On **June 12th**, evening thunderstorms produced damaging winds between 60 and 70 MPH and torrential rainfall across the southern Nebraska panhandle. Flash flooding was observed in and around Scottsbluff where 3-5" of rain fell. The next afternoon, thunderstorms produced wind gusts to 60 MPH at Potter and Dalton. One inch diameter hail was observed at Mitchell and Potter on **June 23rd**. On **June 27th**, evening thunderstorms produced quarter to golf ball size hail, torrential rainfall, and wind gusts to 72 MPH across the northern Nebraska panhandle. Flash flooding was observed at Chadron. There were numerous reports of damaging winds ranging from 60 to 103 MPH across much of the western Nebraska panhandle on **June 28th**. There was extensive damage to a mobile home park west of Chadron. The next afternoon, downburst winds estimated at 90 MPH caused extensive damage to trees, utility poles, and a few buildings near Kimball. Torrential rainfall generated flash flooding in southwest Kimball County on **June 30th**.

Quarter to ping pong ball size hail was observed north of Scottsbluff and west of Alliance on **July 5th**. The next afternoon, quarter and half dollar size hail fell south of Chadron. A peak wind gust of 66 MPH was recorded at Chadron on **July 10th**. A week later, 1" hail fell south of Bushnell. The next afternoon, wind gusts to 60 MPH were reported at Lake Minatare. On **July 22nd**, thunderstorms generated 60 MPH winds, quarter to golf ball size hail, and torrential rainfall across parts of the western Nebraska panhandle. Flash flooding was observed near Broadwater. Wind gusts to 65 MPH and large hail were reported in Dawes and Box Butte counties on **July 26th**. The next day, 1-2" diameter hail fell across the southwest Nebraska panhandle. On **July 28th**, large hail fell near McGrew and Baird. The next afternoon, large hail and wind gusts estimated at 70 MPH were observed across parts of the western Nebraska panhandle. An EF0 tornado touched down in open country west of Dalton.

On **August 3rd**, 60 MPH wind gusts were reported east of Chadron. Quarter size hail fell over and northwest of Sidney on **August 8th**. Three days later, large hail and wind gusts of 60 to 70 MPH were observed across the northern Nebraska panhandle. On **August 18th**, large hail and torrential rain affected Morrill, Kimball and Banner counties. Flash flooding was observed near Bushnell, Bayard, and east of Harrisburg.

Wind gusts to around 65 MPH and quarter size hail affected parts of Dawes, Cheyenne and Kimball counties on **September 3rd**. The next day, very large hail, up to 3" in diameter, fell over parts of Morrill, Kimball and Scotts Bluff counties. On **September 23rd**, large hail and 60 MPH wind gusts affected Sioux and Dawes counties.

On **October 3rd**, quarter to ping pong ball size hail fell near Berea and Alliance. A peak wind gust of 73 MPH was recorded at Chadron.

2016 Nebraska/Iowa Severe Weather Summary

Severe Weather Awareness Week - March 27 - 31, 2017

Extreme Southwestern Nebraska - NWS Goodland, KS

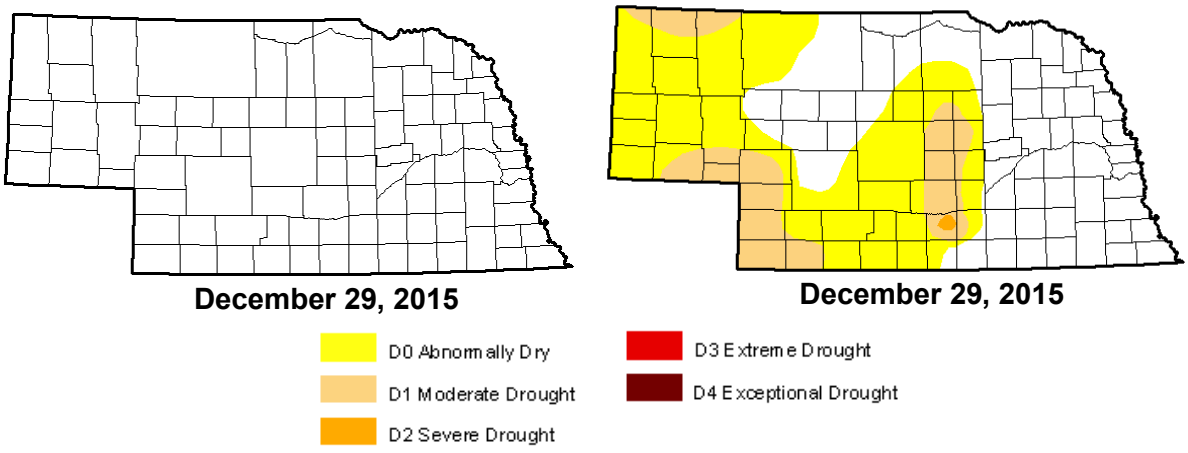
Annual Precipitation

Precipitation varied across southwest Nebraska during the 2016 calendar year. McCook finished the year ten percent above normal with regards to yearly rainfall. This was primarily due to heavy rains received in early September. Other than a wet late spring and early summer, dry conditions returned to southwest Nebraska. In fact, according to the Drought Monitor, widespread drought conditions developed across western and central Nebraska due to a very dry fall when little rain was observed. To put it into perspective, for the month of October, McCook received 0.14" of precipitation, 1.65" inches below normal. This was the driest October since 2003 when only a trace of precipitation was received. Below is a table containing observed precipitation for three sites in southwest Nebraska and two Drought Monitor images to highlight the drought conditions that developed. Southwest Nebraska has been classified as "abnormally dry" to "moderate drought" with the worst conditions reported in Dundy and Hitchcock counties.

Station	2016 Precip	Normal	Percent
Benkelman	17.75"	19.75"	90
Trenton Dam*	20.05"	21.52"	87
McCook	24.82"	22.53"	110

* indicates missing data from Jan-Mar 2016, true numbers likely differ

2016 Drought Monitor Changes

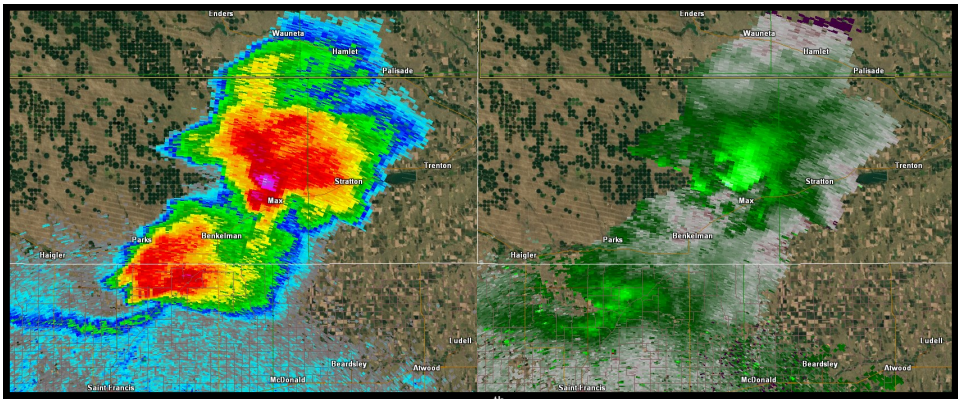


Severe Weather

Overall, the 2016 severe weather season lacked its typical High Plains punch across southwest Nebraska. That is not to say severe weather completely missed the region this year as there were a few notable severe weather events. The first severe weather event of the year, **May 8th**, brought the first and only tornado, a landspout tornado which developed northeast of Indianola in Red Willow County. The tornado stayed in open fields and produced no damage. Through the rest of May, only 6 additional reports of hail or wind were received. This is an unusually low number given the number of powerful storms the High Plains produces each year.

Extreme Southwestern Nebraska - NWS Goodland, KS Con't.

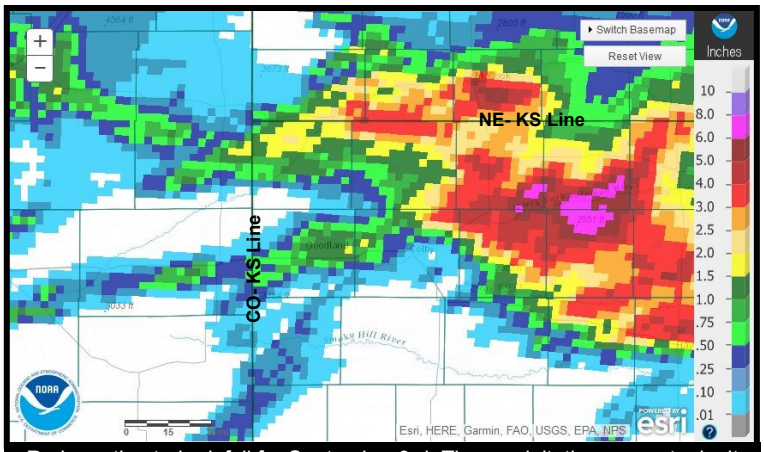
June was yet another abnormally quiet month for severe weather across southwest Nebraska. A few storms produced quarter size hail, winds up to 73 MPH, and flash flooding in McCook on **June 17th**. On **June 28th**, another round of storms led to several reports of 60 MPH straight-line winds and even a report of a dust storm. These winds led to the downing of several large limbs and trees, particularly in Haigler, Parks, and Benkelman.



Radar reflectivity and velocity images of the July 7th significant supercell thunderstorm that moved across SW Nebraska. Images just prior to significant wind damage in Max.

On **July 7th**, one of the supercell thunderstorms the Great Plains is known for moved across portions of Dundy and Hitchcock counties. The thunderstorm that produced significant weather moved across Chase County, then southeast across northern and eastern Dundy County and southwestern Hitchcock County. Widespread wind damage, as a result of estimated 100 MPH gusts, was reported in Max. Several homes and carports suffered structural damage, many trees were blown down, an irrigation pivot was damaged, a camper was blown over on its side and residents lost power due to damage to seven or eight power poles. This same storm went on to produce baseball size hail ten miles south of Stratton. Another supercell thunderstorm moved across western and southern Dundy County but no severe weather was reported with this particular storm. For the rest of July, a few storms produced severe weather on **July 22nd** and **July 28th** but no significant damage was reported.

Drier weather set in for August. While there were thunderstorms in the region, none of them produced severe weather during the month.



Radar estimated rainfall for September 3rd. The precipitation amounts don't do justice to what actually fell in such a localized area.

As often happens across the High Plains, the weather flipped and became quite active again to begin the month of September. Three days of storms, from **September 3rd through September 5th**, produced eight reports of large hail. At least two instances of golf ball sized hail occurred. The larger impact from this event was flash flooding. On the evening of **September 3rd**, 4-10" of rain fell across western Red Willow County. McCook bore the brunt of the resultant flash flooding. Highway 83 was closed due to flooding and stalled cars that were abandoned. Numerous other roads in McCook were closed from flooding. After this round of storms, the light switch was flipped back to off and dry weather set in across southwest Nebraska. This was the last severe weather event of 2016.

2016 Nebraska/Iowa Severe Weather Summary

Severe Weather Awareness Week - March 27 - 31, 2017

Western & North Central Nebraska - NWS North Platte, NE

The severe weather season across western and north central Nebraska started in late March and came to an end in early October. For the season, a total of 17 tornadoes were documented across western and north central Nebraska. Severe thunderstorms produced wind gusts as high as 80 MPH on several occasions with the largest hail of the season being 3" in diameter.

The seasons first severe weather event occurred during the late afternoon and early evening hours of **March 29th**. Storms that afternoon and evening impacted the western Sandhills with hail up to an inch in diameter. No severe winds were reported with this event.

After a quiet April, severe thunderstorms occurred during a multi-day severe event during the second week of May. From **May 7th through May 10th**, numerous severe thunderstorms impacted most of western and north central Nebraska. Thunderstorm wind gusts of 80 to 90 MPH were reported in a downburst just southwest of Grant on **May 7th**. On **May 8th**, hail up to 3" in diameter was reported in Holt county and an EF0 tornado hit near Stockville in Frontier county. After some flash flooding in Boyd county on **May 9th**, a second EF0 tornado touched down near Atkinson on **May 10th**. Both the Stockville and Atkinson tornadoes briefly touched down with no damage reported.

Severe storms returned to western and north central Nebraska during the last week of May. On **May 24th**, an EF0 tornado touched down west of Enders reservoir, flipping over an empty center pivot. From **May 25th through May 30th**, a stationary front was draped across western and north central Nebraska. This served as the focal point for severe thunderstorms each day during the late afternoon and evening hours. Hail up to the size of golf balls and heavy rain led to flash flooding in southeastern Lincoln county on **May 28th**. Numerous roads were washed out south of Brady and Maxwell from the estimated 3 to 5" of rain which fell.

The first week and a half of June was benign with no severe storms reported across the area. Beginning on **June 13th**, several rounds of severe storms impacted western and north central Nebraska. Severe storms were reported on the **14th, 17th, 18th and 27th**. Hail up to tennis ball size was reported south of Sutherland on the **26th**, while 2" diameter hail hit southeast of Chappell on **June 27th**. Severe thunderstorms developed in the eastern Nebraska panhandle on **June 28th**. As they moved to the southeast, numerous 60 to 70 MPH thunderstorm wind gusts were reported. In addition, two tornadoes touched down in far southwestern Cherry county. One was an EF0 which produced no damage. A second tornado destroyed a calving shed, tossed an empty 500 gallon tank one mile, and snapped several trees. This tornado was rated EF2.

Tornado Damage North of Hyannis.
Photo from NWS Storm Survey.

Western & North Central Nebraska - NWS North Platte, NE Con't.

Supercell thunderstorms developed during the mid afternoon hours on **July 6th** over the northeastern Nebraska Panhandle. As these storms moved to the southeast, a total of 7 tornadoes were reported across Sheridan, southwestern Cherry, Arthur and McPherson counties. Though most of the 7 tornadoes were rated EF0, two of the tornadoes in far southwestern Cherry county were rated EF1. The southwestern Cherry county tornadoes damaged several outbuildings at two separate residences and snapped several large trees. The supercell thunderstorms organized into a line of severe thunderstorms later that evening. As the storms pushed into southwestern and central Nebraska, wind gusts of 70 to 80 MPH were reported. In addition to strong winds, hail up to the size of golf balls was reported north of North Platte.

Tornado north of Hyannis in far southwest Cherry County.
Photo courtesy of Jason Cogar.

Tornado in McPherson County July 6th.
Photo courtesy of Amy Coffman.

A second July outbreak of severe storms hit the eastern panhandle and Sandhills on **July 26th**. Two tornadoes hit northeastern Sheridan county with minor damage occurring at a farmstead northeast of Clinton. Storms moved southeast into the evening hours producing winds gusts of 70 to 80 MPH in eastern Cherry county.

Over the next couple of weeks, a benign weather pattern set up across western and north central Nebraska. This changed on **August 11th**, as strong to severe thunderstorms developed across the central Sandhills and portions of southwestern Nebraska. Two landspout tornadoes developed in northeastern Custer county and produced no damage. Elsewhere, golf ball sized hail was reported in Cherry county and a 72 MPH wind gust was measured at the North Platte Regional Airport. Strong winds led to several reports of tree damage across North Platte.

Severe thunderstorms developed across Keith county on **September 4th** and tracked northeast into the western and central Sandhills. Hail up to the size of golf balls was reported near Brule. A tornado briefly touched down north of Stapleton producing no damage. Another round of severe storms hit southwestern Nebraska on **September 5th** producing hail up to golf ball size near Harry Strunk Lake in Frontier county. A strong cold front tracked across western and north central Nebraska on **October 3rd**, leading to severe thunderstorms across the northern Sandhills and southwestern Nebraska. Thunderstorm wind gusts up to 75 MPH and hail up to the size of ping pong balls were reported.

2016 Nebraska/Iowa Severe Weather Summary

Severe Weather Awareness Week - March 27 - 31, 2017

South Central Nebraska - NWS Hastings, NE

The first notable event and tornado of the year for the NWS Hastings coverage area touched down on **April 24th** in Nuckolls County. This highly visible, EF1 rated tornado had a roughly 2.5 mile path northwest of Superior, remaining in rural areas, and damaged trees, fence line and power poles. The maximum wind speed was estimated to be near 100 MPH. Reports of large hail were limited, with half dollar size hail southwest of Red Cloud and golf ball size hail reported in and just east of Superior. The photo to the left is of the tornado near Superior, taken by Juan Garcia.

Flooding over Highway 14 near Deshler. Courtesy of Trevor Tetley.

April 26th brought another batch of large hail, including tennis ball size hail near Deshler, but the bigger story was with flooding from heavy rainfall. The main axis of heavy rain extended into Nuckolls and Thayer Counties out of Kansas, with a secondary axis further west over Buffalo and Phelps Counties. In that eastern axis, radar estimated totals of 3-8", with ground truth harder to come by, though 5.10" was reported by a NeRAIN observer in Ruskin. Significant flash flooding occurred over eastern Nuckolls/western Thayer Counties, when numerous rural roads and part of Highway 136 between Ruskin and Deshler were closed due to running water. In Deshler, roads were covered and due to the high levels of Spring and Snake Creeks, residents of an assisted living facility had to be evacuated. One rescue was conducted when a person went out to board up their home and was surrounded by water.

May 8-10th was the first active period of May. Reports were west of Highway 281 on **May 8th**, the exception being a 75 MPH wind gusts reported in Red Cloud, uprooting trees at a local golf course. Penny to ping pong ball size hail fell across Sherman and Dawson Counties, with tree damage in Minden. On **May 9th**, quarter to golf ball size hail fell from Phelps County over to Fillmore County. Two tornadoes were reported, the first was a brief EF0 landspout near Odessa. An EF0 tornado touched down later in Clay County near Fairfield. This tornado caused minor damage at Sandy Creek School, knocking out vehicle windows in the parking lot and damaging the overhang to the front door. Trees, fencing and irrigation pivots were also damaged. While strong winds, gustnadoes and quarter to golf ball size hail were reported on **May 10th**, the bigger story was with the heavy rain and flash flooding. Rain of 3-8" resulted in flash flooding across portions of Hamilton, Polk and York Counties. Hamilton County was hardest hit, with 5-8" of rain, resulting in numerous county roads being closed. One home near Marquette had two feet of water in and around the house. Animals at the farmstead had to be moved, with witnesses claiming the horses were nearly belly-deep in water.

May 23rd-30th was an active end. Along with quarter to tennis ball size hail, **May 23rd** had a brief tornado near Juniata, with no damage. In Grand Island, a quick 2-3" of rain resulted in flash flooding. Manhole covers were displaced and an underpass closed. **May 25th** was driven by a few wind reports, with only one report of quarter size hail in Furnas County. Winds of 60-70 MPH were reported, the highest gusts resulting in blowing dust, damaged irrigation pivots and downed trees near Bertrand. Quarter to golf ball size hail was scattered around the area on **May 26th, 27th and 29th**. Isolated flash flooding also affected portions of Thayer and Fillmore Counties on **May 27th**, when 3-5" of rain fell and water ran over Highway 14 near Milligan. Wind gusts as high as 67 MPH along the Adams/Clay County line east of Hastings brought an end to the month on **May 30th**.

By typical June standards, 2016 was a very quiet month. Juniata saw another weak, brief tornado on **June 3rd**, touching down southwest of town. The only storm of note crossed Webster County, with nickel size hail and 75 MPH gusts near Red Cloud. **June 17th** was the active day of the month. The majority of severe storms targeted areas west of Highway 281, with gusts of 60-75 MPH and some quarter to golf ball size hail. The strongest wind gusts included 75 MPH near Loomis, 70 MPH near Beaver City, and 68 MPH near Kearney.

South Central Nebraska - NWS Hastings, NE Con't.


July 5th
St. Paul - Courtesy of Mike Fitzgerald.

July 5-6th were active. The 5th had primarily hail and the 6th had primarily damaging wind. On the **5th**, most activity was across Hall and Adams Counties and points northeast to Columbus. Hail ranged from pennies to ping pong ball size. Winds of 60-70 MPH resulted in some tree damage and power outages, and a semi-truck was tipped over on Highway 81 in northern Polk County. On the **6th**, a small bow echo crossed through Valley and Greeley Counties, with another affecting areas south of Interstate 80 to the state line. Wind gusts reached 60-70 MPH.

Just after midnight on **July 27th**, a squall line brought winds of around 60-75 MPH to areas from Oxford to Ord. The strongest wind gusts were recorded in Edison (76 MPH) and Lexington (64 MPH). Tree limbs up to 6-8" in diameter were downed and power lost in a few spots. A few marginally severe wind and hail reports on **July 30th** affected portions of Hall and Adams County, with a large tree blown down on Shady Bend Road in Grand Island and a semi-truck blown over on Interstate 80 near Alda. Heavy rainfall of 3-5" resulted in some flash flooding, with part of Highway 11 near Dannebrog and Highways 70/58 near Arcadia affected.

It was an interesting start to August for western Furnas County, which remained under Severe Thunderstorm Warnings for more than three hours on **August 1st**. This resulted from a quasi-stationary, multicell cluster of storms anchored over the area, which dropped hail ranging from penny to golf ball size. Another brief, weak tornado touched down on **August 11th**. This tornado occurred in far southern Sherman County, north of the town of Ravenna, and no damage was reported. Outside of the tornado, wind gusts of 60-70 MPH and isolated quarter size hail were reported on the fringes of the area, in Dawson and Thayer Counties.

Thunderstorms drenched part of Adams, Webster, Franklin and Nuckolls counties with 3-7" of rain on **August 28-29th**. Extensive flooding along the Little Blue River led to rural roads/bridges being damaged, some were barricaded for days. The worst flooding was near Ayr, in the Crystal Lake Recreation Area and campground. Electrical boxes, buildings and picnic tables were damaged, and the park was closed for over two weeks. Adams/ Webster Counties was one of the driest areas in the state, included in the Severe Drought category by the U.S. Drought Monitor. An example of going from drought to flood, the NWS cooperative observer near Blue Hill tallied only 2.77" of rain from Jun 1st-Aug 27th, then had over twice that (6.62") on this single night!

September was a fairly quiet month, with just two events. **September 12th**, had an isolated severe storm over York County, dropping hail up to golf ball size. **September 16th** saw a few more quarter to half dollar size hail reports, along with gusts of 60-70 MPH. A gust of 68 MPH was recorded by a mesonet site near Red Cloud.

The first week of October would bring two rounds of severe weather. On **October 4th**, there was early morning and afternoon large hail and heavy rain. Ping pong ball size hail even fell at 3:20 AM in Aurora! That afternoon, hail up to 2" in diameter fell across parts of Thayer and Fillmore Counties. Between the two rounds of storms, locations along the Highway 81 corridor had 3-5" on rain. Two days later, on **October 6th**, separate rounds of storms formed, with hail (penny to half dollar size) again over Fillmore and Thayer Counties.

For the second year in a row, November tornadoes were recorded in Nebraska. On **November 27th**, weak tornadoes touched down in Franklin County (near Upland), Webster County (near Red Cloud) and Nuckolls County (near Lawrence). An EF1 tornado touching down east of Red Cloud, with estimated winds of 95 MPH. This tornado uprooted trees, destroyed an outbuilding and upset two irrigation pivots along its path. The other two tornadoes were rated EF0, w/ little damage reported.


Near Red Cloud - Nov. 27th
From Red Cloud FD

Check out more details on the **Christmas Day** severe weather event on **page 13**!

2016 Nebraska/Iowa Severe Weather Summary

Severe Weather Awareness Week - March 27 - 31, 2017

Eastern Nebraska - NWS Omaha/Valley, NE

The 2016 severe weather season across eastern Nebraska and western Iowa was average. A total of 191 reports of wind and hail were received across the area, as well as 15 tornadoes. On average, 14.3 tornadoes occur each year in the Omaha/Valley, NE area of responsibility. Although the event count was near average, there were some significant events that included a strong tornado, giant hail measured at 5 inches in diameter, and damaging winds.

May 9th EF1 Tornado near Lincoln, NE
Photo taken by Bill Sorenson

Although there were a couple of reports of severe weather in March, the severe weather season began in earnest in late **April** with events on the **25th** through **27th**. The thunderstorms on the **25th** produced isolated reports of both hail and wind in eastern NE and western IA, but one stronger storm in the Lincoln area did produce damaging hail measured up to 2 inches in diameter. The activity on the **26th** was confined to far southeast Nebraska, where isolated large hail and strong winds were reported. The event on the **27th** was more widespread and also included tornadoes. A supercell thunderstorm produced a tornado in southwest Iowa near the town of Stanton that damaged a farmstead. Another supercell tracked across southern and western Omaha and produced a series of small tornadoes in northwest Omaha. Although the tornadoes occurred in a densely populated area, the tornadoes were weak and produced relatively little damage. There were also reports of severe wind and hail on the **27th** as well, with up to golf ball size hail covering the ground several inches deep reported over parts of northwest Douglas into Washington Counties.

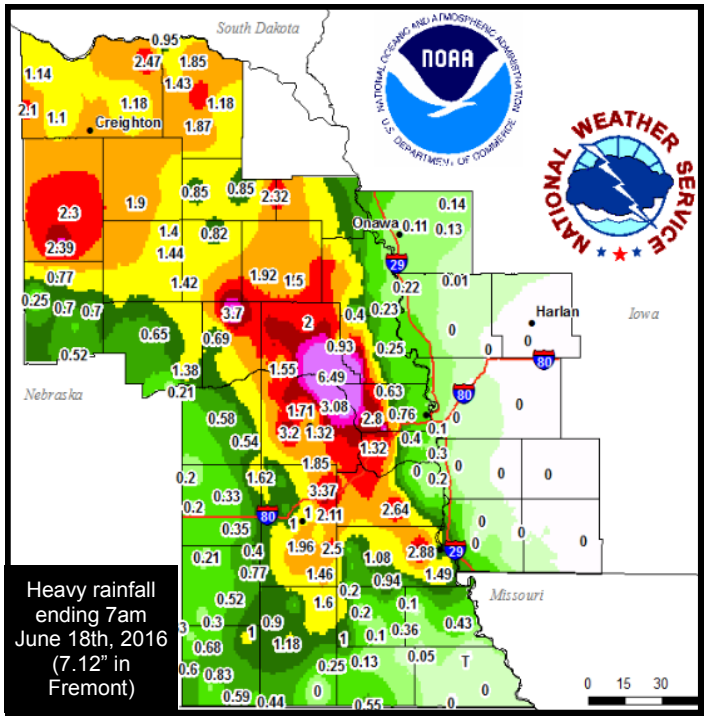
May 9th Large hail damage in SE Lincoln

The next bout of severe weather occurred on **May 9th**, and likely was the most significant event of the year across the area. A very intense supercell thunderstorm developed near the city of Lincoln by late afternoon. This supercell thunderstorm did produce two small tornadoes that were filmed by numerous local residents. One of these impacted a subdivision in southeast Lincoln but did little damage. The other tornado occurred in rural areas southeast of Lincoln. Of more impact, though, was the giant hail, measured at up to 5", that produced widespread damage to homes, businesses, and vehicles in east Lincoln. Also, due to the nearly stationary nature of the thunderstorm, flash flooding occurred in south Lincoln along Antelope Creek. The strongest tornado of the year, rated at EF2, also occurred on **May 9th** near the town of Nehawka in Cass County. This slow moving tornado occurred for 26 min and traveled 3.27 miles. The tornado struck a farmstead to the northwest of town, producing significant damage. Other scattered severe weather in the form of large hail and damage winds were reported across all parts of eastern Nebraska and southwest Iowa.

Although other isolated occurrences of severe weather did occur in **May**, specifically on the **26th** and **30th**, the next concentrated period of increased activity occurred in late June and early July. A complex of storms developed over South Dakota and Minnesota and moved to the southwest into northeast Nebraska on the evening of **June 17th**. This line produced widespread wind damage across northeast Nebraska, with a measured wind gust up to 86 mph, but there were numerous reports of winds of 60 to 70 mph. As this system

Eastern Nebraska - NWS Omaha/Valley, NE Con't.

moved south into east central Nebraska, the speed of the system decreased and torrential rainfall occurred over parts of east central Nebraska. This produced significant flash flooding, with the hardest hit area being Fremont, where nearly 8" of rainfall occurred. The next round of severe weather occurred on the **29th** of June, when a cluster of supercell thunderstorms produced hail, wind, and a couple of tornadoes from west central Iowa into east central Nebraska. The most intense of these storms moved from Harrison to Pottawattamie County, producing significant hail as well as two tornadoes, one of which crossed Interstate 680 and was filmed by numerous local area residents. An additional supercell developed over Omaha and moved south through Sarpy and Cass County, producing large hail and damaging winds as well. Then on the nights of **July 5th and 6th**, lines of thunderstorms moved out of central and western Nebraska and crossed eastern Nebraska and western Iowa. These thunderstorms were wind damage producers. The area from around Columbus to Tekamah was especially hard hit on the evening of the **5th**, with wind gusts measured at 70 and 78 mph, respectively. The line on the night of the 6th was particularly damaging in parts of southwest Iowa, where a roof was lifted off a power plant near the town of Villisca, but other scattered wind damage occurred over eastern Nebraska and western Iowa with the line, as well.



Heavy rainfall ending 7am June 18th, 2016 (7.12" in Fremont)

As typical for the region, the occurrences of severe weather decreased later in July and into August. Nevertheless, residents of eastern Omaha and Council Bluffs will remember the thunderstorms on the evening of **August 4th**. Conditions were not favorable for widespread severe weather, but they were conducive for the development of landspout tornadoes. One such landspout tornado developed just south of Interstate 80 in Council Bluffs during rush hour. Due to the high cloud base of the thunderstorm, this tornado could be seen for several miles around. Fortunately, this tornado remained nearly stationary over Lake Manawa during its lifespan, producing little damage. Another high-impact late season event occurred on the evening of **August 23rd** as thunderstorms developed during the evening over parts of eastern Nebraska and western Iowa. One particular thunderstorm developed over Omaha and moved north into southern Washington County. This thunderstorm became a supercell and produced two small tornadoes near the town of Washington, as well as reports of damaging winds and large hail. This supercell was nearly stationary over Washington County, producing significant rainfall, which led to flash flooding in southern Washington County including the town of Blair. This heavy rainfall also led to flooding along the Big Papillion Creek into northern Douglas County. These thunderstorms developed into line and dropped southeast through the Omaha metro area producing a series of downbursts, one of which had a measured wind gust of 96 mph at Omaha Eppley airport.

The severe weather season continued to wind down across the area in September and October. Additional events did occur on **September 15th**, with a small tornado in Washington County and other scattered damaging wind and hail reports, and on **October 6th**, when a supercell moved north out of Kansas into southeast Nebraska, producing hail as large as baseballs near the Fairbury area.

2017 Summer Climate Outlooks

Severe Weather Awareness Week - March 27 - 31, 2017

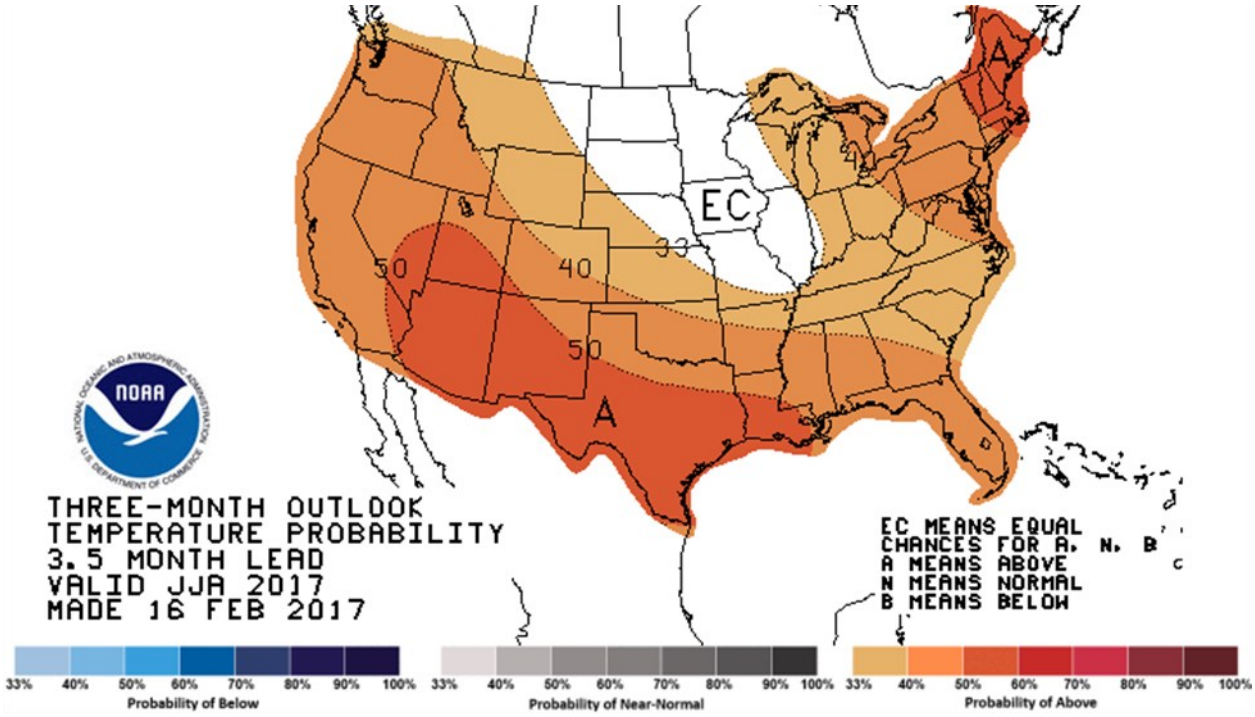
As we head into the warm season, we enter a season where outlooks depend less on tropical forcing (like El Niño and La Niña) and more on local influences. By nature, that means the outlooks are a bit less confident in the summer months than they are in the winter, especially for precipitation.

The tropics are returning to a neutral state after a weak La Niña ended in the late winter. The forecast models are split about 50/50 between neutral continuing through the summer and El Niño developing by late summer or early fall. While influences are weaker in the summer, there can be some patterns that emerge based on whether the atmosphere continues in a neutral pattern or starts to pick up El Niño tendencies.

Right now, the outlooks are based more on neutral conditions continuing through the summer months. The biggest influences to the outlooks are temperature trends that have emerged over the last few decades, as well as possible soil moisture conditions at least heading into the early summer.

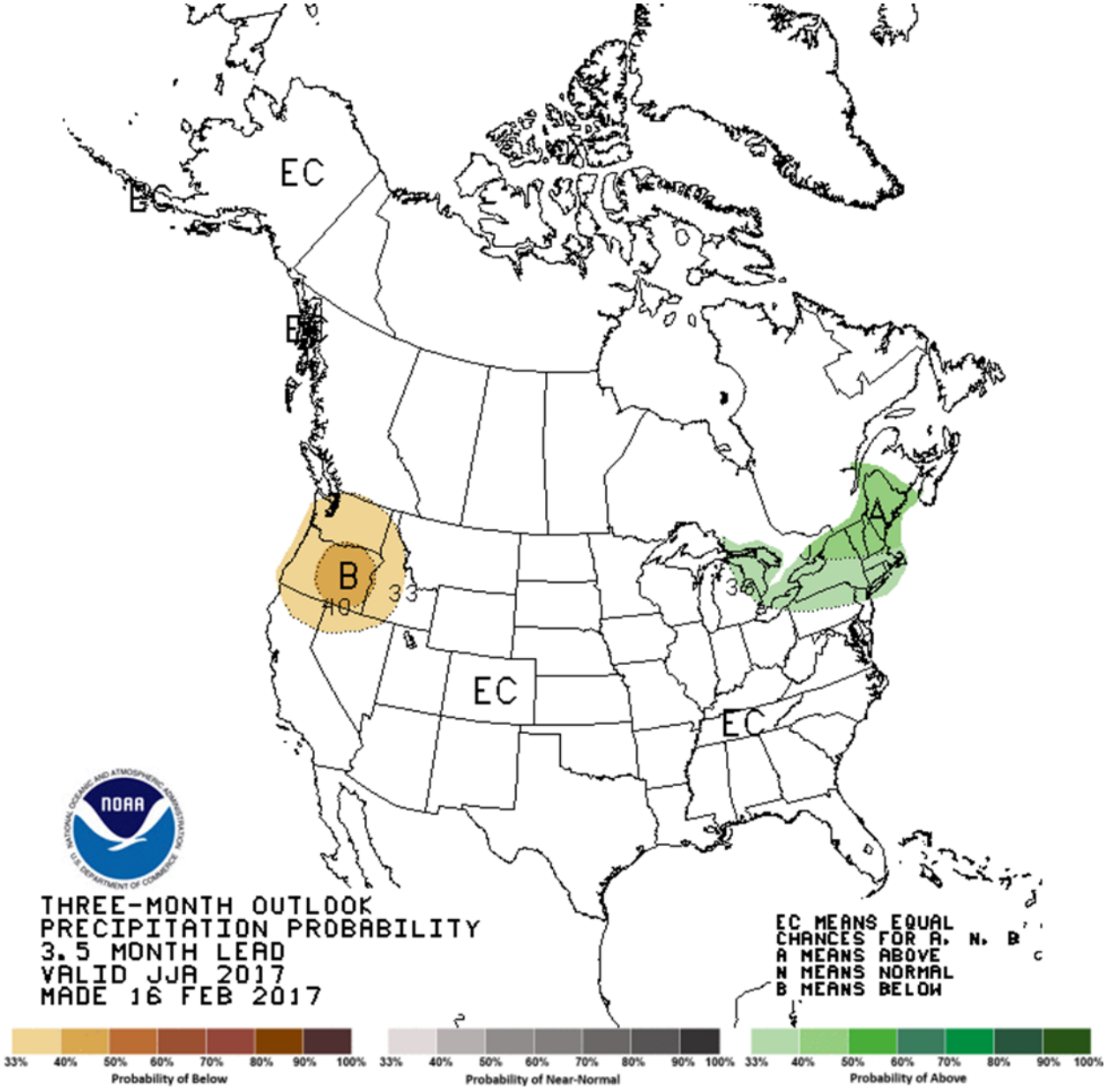
In western to central Nebraska, the summer outlook tips our odds just slightly toward higher than usual chances for above-normal temperatures. In central to eastern Nebraska, the chances for above-, near, and below-normal temperatures are equal. Without clear signals to influence the summer precipitation outlook, we are left with equal chances for above-, near-, and below-normal precipitation.

3-Month Temperature Outlook: June-August



Summer Outlooks Con't.

3-Month Precipitation Outlook: June-August



Central Plains Severe Weather Symposium and Family Weatherfest

University of Nebraska - Lincoln's 17th Annual Central Plains Severe Weather Symposium and Family Weatherfest

Saturday, April 1, 2017
9 a.m. - 2 p.m.
Severe Weather Seminar
12:30 p.m.-4 p.m.
Nebraska Innovation Campus
and Salt Creek Road
Lincoln, Nebraska

Our mission is two-fold. To provide severe weather education and preparedness information to the public through:

1. An annual symposium which brings severe weather experts to our community,
2. The Family Weatherfest which provides K-12 weather and science educational exhibits

The underlying theme for all CPSWS and Family Weatherfest events is: "Surviving the Storms". Exhibitors and Severe Weather Experts are brought in to each event to touch upon this theme, and its varying aspects. One unique aspect of the CPSWS and Family Weatherfest has been its ability to bring together different organizations and agencies under one roof to promote its underlying theme.

The CPSWS, and its Family Weatherfest are both brought to the public as a Free Community educational outreach event. It is the commitment of CPSWS and Family Weatherfest to create an outlet that puts severe weather information into as many homes and businesses in the region as possible and this is accomplished by making this a "no admission charge" family activity. Recognizing that we should not charge the public when it comes to learning about severe weather safety, we have in the past and will in the future continue to bring this event to the public FREE of charge.

For more information, please visit: srn.unl.edu/cpsws

School of Natural Resources

WEATHERFEST

CPSWS
Central Plains Severe Weather Symposium